FINAL

Environmental Impact Statement
FOR THE
Jackpile-Paguate Uranium Mine Reclamation Project

LAGUNA INDIAN RESERVATION

CIBOLA COUNTY, NEW MEXICO

U.S. DEPARTMENT OF THE INTERIOR

Bureau of Land Management
Albuquerque District Office
Rio Puerco Resource Area

Monte Jordan
Acting State Director, New Mexico

Bureau of Indian Affairs
Albuquerque Area Office

Sidney L. Mills
Area Director

ABSTRACT: The Department of the Interior (DOI) proposes to approve a reclamation plan for the Jackpile-Paguate Uranium Mine. The mine is located on three leases of Laguna Indian Tribal land in Cibola County, west-central New Mexico. The mine was operated by Anaconda Minerals Company, a division of Atlantic Richfield Company, from 1953 through early 1982. The No Action Alternative and reclamation proposals developed by Anaconda, DOI (with two options) and the Pueblo of Laguna are analyzed in this document. A Preferred Alternative was developed using various components from these proposals. The affected environment consists of 2,656 acres of open pits, waste dumps and associated facilities. Under the No Action Alternative, the minesite would remain environmentally unsuitable for any productive land use except for mining. The reclamation proposals would, to varying degrees, restore the minesite to productive land use (primarily livestock grazing), reduce radiological and physical hazards, blend the visual characteristics of the minesite with the surrounding lands, and provide short-term employment for the Pueblo of Laguna. Reclamation would cause short-term adverse effects which would be mitigated to the extent possible.

For Further Information Contact: Michael J. Pool, EIS Team Leader, U.S. Department of the Interior, Bureau of Land Management, Rio Puerco Resource Area, 435 Montano NE, Albuquerque, New Mexico 87107. Telephone: Commercial (505) 766-3114, FTS 474-3114.

Type Of Action: (X) Administrative ( ) Legislative

Date Draft EIS Filed with EPA: March 5, 1985

Date Final EIS Filed with EPA:

OCT 24 1986

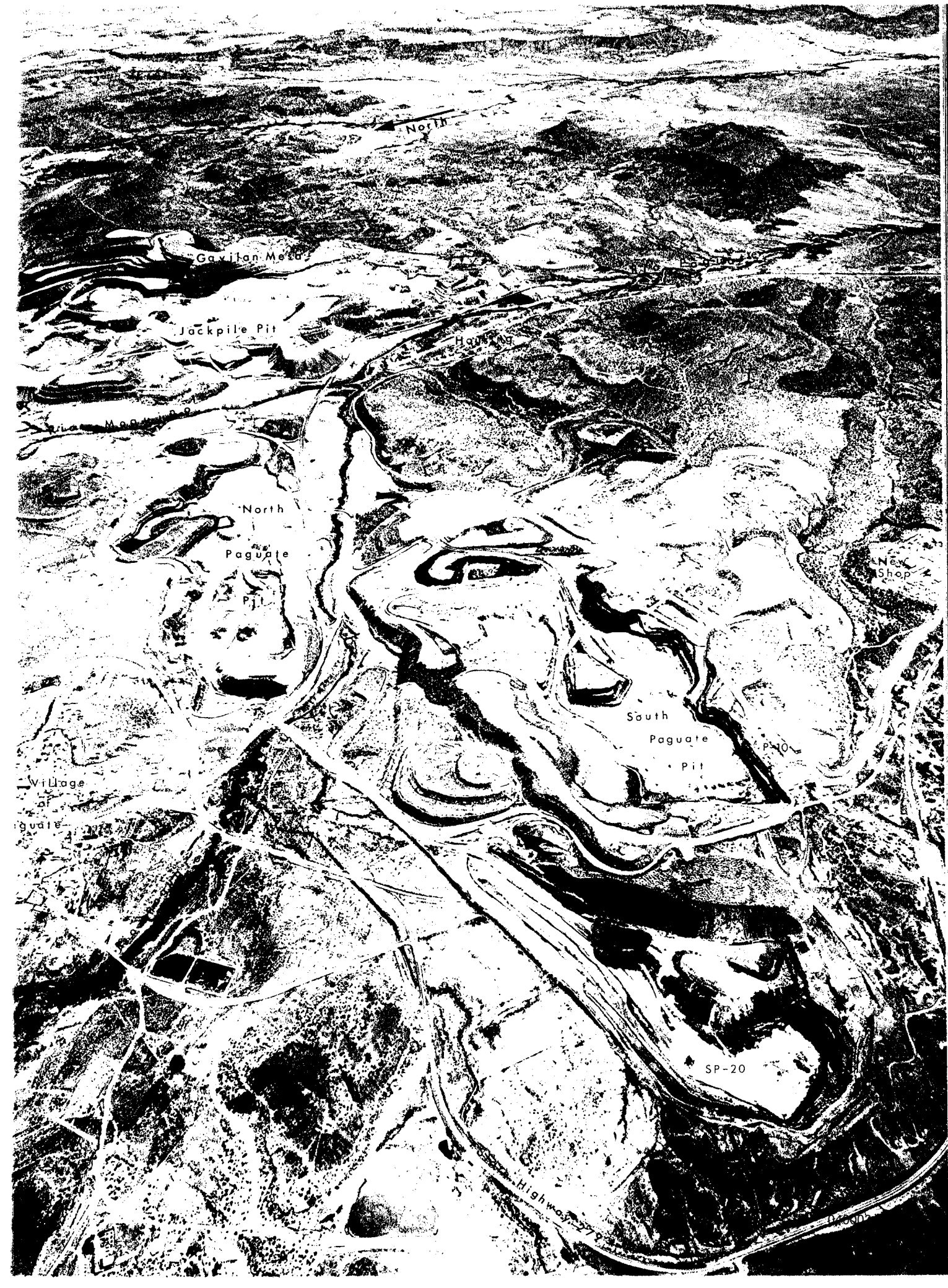
North
Gavilan Mesa
Jackpile Pit
North
Paguate
Pit
New
Shop
South
Paguate
Pit
Village
of
guate
SP-20
Highway

TABLE OF CONTENTS

LIST OF TABLES

LIST Of TABLES (Continued)

LIST OF FIGURES (Continued)

LIST Of TABLES (Continued)

VISUAL
(Map Pocket in Back of EIS)

LIST OF MAPS

LIST OF FIGURES

SUMMARY

Introduction

This Environmental Impact Statement (EIS) analyzes the environmental consequences of six alternatives (including the No Action and Preferred Alternatives) for reclaiming the Jackpile-Paguate uranium mine. The mine is located on three tribal leases within the Laguna Indian Reservation, about 40 miles west of Albuquerque, New Mexico. The leaseholder, Anaconda Minerals Company, mined from 1953 to 1982. Out of a total of 7,868 leased acres, 2,656 acres were disturbed by mining. This disturbance includes three open pits, 32 waste dumps, 23 protore (sub-grade ore) stockpiles, four topsoil stockpiles and 66 acres of buildings and roads.

The lease terms and Federal regulations give the Department of the Interior (DOI) the authority to require reclamation of the minesite. The two main DOI agencies involved in this project are the Bureau of Land Management (BLM) and the Bureau of Indian Affairs (BIA). The BLM acts as the overall technical adviser while the BIA is responsible for the surface aspects of reclamation.

The public scoping process was used to focus on the major issues to be considered in this EIS. The two major issues identified were ensuring human health and safety and reducing radioactive releases.

There are no Federal or State regulations or standards for reclaiming uranium mines so a range of alternatives are evaluated in this document. These alternatives are: 1) No Action 2) Green Book Proposal 3) DOI Proposal (with Monitor and Drainage Options) 4) Laguna Proposal 5) Anaconda Proposal and 6) Preferred Alternative.

Description of the Alternatives

No Action Alternative

For this EIS, the No Action Alternative would mean that no reclamation work would be performed. Anaconda would continue their security program to prevent unauthorized entry and they would continue to operate an environmental monitoring program in perpetuity. This alternative is not considered reasonable for this project due to the need to protect public health and safety.

Green Book Proposal

The Green Book Proposal was originally developed by Anaconda Minerals Company but was subsequently replaced by the 1985 Multiple Land Use Reclamation Plan on August 19, 1985. The Green Book is being carried forward in the Final EIS for continuity of impact analysis and consistency with the DEIS.

The open pits would be backfilled to at least three feet above ground water recovery levels as projected by Dames and Moore, 1983. All highwalls would be scaled to remove loose material. The rim of Gavilan Mesa would be cut back by mechanical means or blasting and the base of the highwall would be buttressed with waste and overburden. Waste dump slopes would be reduced to between 2:1 and 3:1; most slopes would be terraced. Jackpile Sandstone exposed by resloping would be covered with four feet of overburden and one foot of topsoil. All protore and waste material lying within 200 feet of the Rios Paguate and Moquino would be removed. Facilities would either be removed or cleaned up and left intact. All disturbed areas (pit bottoms, waste dumps, old roads, etc.) would be topsoiled and seeded. Reclamation would be considered complete when the weighted average for basal cover and production on revegetated sites equals or exceeds 70 percent of that found on comparable reference sites. The post- reclamation monitoring period would be a minimum of three years.

DOI Proposal (Monitor Option and Drainage Option)

This alternative was developed by the DOI. It is based on a series of technical reports, contracted studies and fiel data. Although similar to the Green Book Proposal in overall concept, it varies in important details.

Because of concerns over the environmental impacts of either ponded water or salt build-up in the open pits, DOI has identified two options for treatment of the pit bottoms: 1) a Monitor Option which would backfill the pits with protore, excess material from waste dump resloping and soil cover. Due to the excess material (approximately 19 million cubic yards), the estimated backfill elevations of the pit floors could be 40 to 70 feet higher than the Green Book proposed minimum. The pits would remain as closed basins, in which case the potential build-up of salt and saline water in the soils of the pit bottoms would be monitored. If soil problems are observed, additional backfill and revegetation would be required. The monitoring period would be of sufficient duration to determine the stable future water table conditions; and 2) a Drainage Option which would restore the natural mode of overland runoff from the pit areas. Backfill volumes and elevations would be approximately the same as for the Monitor Option, but none of the pits would be left as closed basins. Open channels would be constructed with a slope equal to or flatter than local natural watercourses to convey runoff from the pit areas to the Rio Paguate. This would avoid ponded water or undrained saline soils on the reclaimed minesite.

Laguna Proposal

This alternative was developed by the Pueblo of Laguna in consultation with their technical consultants. In May 1986, the Pueblo provided the DOI with details and/or changes to the Laguna Proposal which are reflected in the Final EIS.

Under this proposal, all pits would be backfilled 10 above groundwater recovery levels projected by Dames and Moore, 1983. In general, the top 15 feet of each highwall would be cut to a 45 degree angle. With few exceptions, waste dump slopes would be reduced to 3:1. Remove all contaminated material within 100 feet of the Rio Paguate. Remove waste dumps 50 feet back from the Rio Moquino and armor the toes of the dumps with riprap. Minesite facilities would be handled essentially the same as under the DOI's Proposal except that the rail spur would remain intact. Topsoiling, seeding techniques and other reclamation measures would be the same as DOI's Proposal. The post-reclamation monitoring period would vary from 3 to 20 years.

Anaconda Proposal

The Jackpile and South Paguate open pits would be backfilled to an extent that would prevent chronic free-water ponding with groundwater levels controlled in the backfill by phreatophytic vegetation. The North Paguate open pit would be made into a water storage reservoir by diverting the Rio Paguate through the pit. The rest of Jackpile and North Paguate pit highwalls would be scaled or trimmed back a distance of 10 feet at a 3:1 slope. No additional modification of the South Paguate pit highwall is proposed. Waste dump slope modifications and topdressing requirements would vary. All Jackpile Sandstone and waste material would be moved back 50 feet from the Rios Paguate and Moquino. All buildings and other surface structures would be left intact where it is safe to do so. Revegetation success would be based on a comparison of the entire revegetated area relative to an analogous reference area on a weighted average basis. Revegetated areas would be sampled for the third year after the last seeding or reseeding effort by or for Anaconda and year-to-year thereafter until success criteria is met.

Preferred Alternative

Pits would remain as closed basins. They would be backfilled to at least 10 feet above the Dames and Moore (1983) projected groundwater recovery levels. In general, the top 15 feet of each highwall would be cut to a 45 degree angle. All soil at the top of the highwall would be sloped 3:1. With few exceptions, waste dump slopes would be reduced to 3:1. There are two options for stream stabilization: Option A - to remove all material within 200 feet of the Rios Paguate and Moquino, and construct a concrete drop structure across the Rio Moquino and Option B: to remove all contaminated material within 100 feet of the Rio Paguate and to remove all waste dumps within 50 feet of the Rio Moquino and armoring the toes of the dumps with riprap. Facilities would either be removed or cleaned up and left intact. All disturbed areas (pit bottoms, waste dumps, old roads, etc.) would be topsoiled and seeded. Reclamation would be considered complete when revegetated sites reach 90 percent of the density, fequency, foliar cover, basal cover and production of undisturbed reference areas. The post-reclamation monitoring period would vary for each parameter.

Environmental Consequences of the Alternatives

No Action Alternative

Mineral resources in the P15/17, NJ-45 and P-13 underground areas would remain accessible. Normal erosion would cause significant losses of all protore outside the pits. Gavilan Mesa would eventually collapse and bury the protore buttress at its base.

The North and South Paguate pit highwalls would be stable. Gavilan Mesa is only marginally stable and would eventually fail.

All 32 waste dumps would eventually experience mass failure resulting in blocked drainages, alteration of stream courses, increased stream sediment loads and decreased surface water quality.

Ground above the P-10 decline could experience sudden and significant subsidence. Unsealed underground openings would present physical and radiological hazards.

For the population within a 50-mile radius of the minesite, the absolute risk model predicts 15 additional radiation-induced cancer deaths over a 85-year period, of which only 0.3 would be lung cancer.

There would be perpetual surface water loss of 200 acre-feet per year. Water quality in the rivers would decrease over time due to erosion of protore piles and waste dumps. Water ponded in the open pits would have elevated levels of virtually all constituents.

Ground water would double in conductivity as it flowed through mine materials. Up to 50 acres of saline ponds would exist in the pit bottoms.

Arroyo headcutting would eventually erode into the bases of I, Y, Y2 and FD-3 dumps resulting in increased sediment loads to the rivers.

Paguate Reservoir would continue to receive sediment at a rate of 22 acre-feet per year.

The Rios Paguate and Moquino could migrate laterally and erode the adjoining waste dumps causing increased sediment load and possibly increased levels of total dissolved solids (TDS), heavy metals and radioactive elements in the rivers.

Mean waste dump erosion would be 79 tons per acre per year resulting in increased sediment load to the rivers and a deterioration of surface water quality.

Total Suspended Particulate (TSP) levels could exceed Federal and State standards for short periods. This would present an aesthetic

Headcuts would be armored to slow erosion, but the armoring would become ineffective due to siltation and bypassing and erosion would continue.

Sedimentation of Paguate Reservoir would be reduced by reclamation.

The removal of waste dumps 200' back from the centerline of the Rios Paguate and Moquino would provide a buffer against lateral migration and bank caving and thus reduce the possibility of adverse water quality impacts.

Mean total waste dump erosion would be 26 tons per acre per year (a 61 percent reduction from the No Action Alternative).

TSP levels would be within Federal and State standards. Since all radiological material would be covered there would be no radiological air quality health impacts.

Soil erosion rates would be reduced. Vegetative cover would lead to increases in wildlife populations. However, revegetated sites with only 70 percent of the basal cover and production of native reference areas would be less productive than natural sites and less capable of supporting populations of native and domestic herbivores.

Improved access to cultural sites could lead to increased vandalism as well as providing easier access for religious purposes.

Visual resource quality would be enhanced compared to the No Action Alternative.

Reclamation would temporarily increase employment and income.

Energy usage would be 292,000 kilowatt hours and 5.4 million gallons of fuel. Reclamation would require 201 man-years of labor. There could be 30.2 equipment use accidents.

DOI Proposal (Monitor and Drainage Options)

Specifications are proposed to control ground vibration and air blast effects. No blast related damage expected.

Impacts on mineral resources would be the same as the Green Book Proposal except that extra highwall stabilization techniques would lessen the chance of Gavilan Mesa collapsing on the protore buttress.

All highwalls would be scaled to reduce rockfall hazards. The top 10 feet of any soil on the North and South Paguate highwall crests would be cut back to a 3:1 slope to prevent piping. The South Paguate pit highwall would be fenced to limit access to the crest. Recontouring Gavilan Mesa would increase its safety factor and lessen the chance of mass failure.

problem and possibly a health risk since radioactive particulates could be eroded from the exposed protore piles.

Soil erosion rates would be high. Meager and scattered vegetative re-establishment would continue by secondary succession on habitable sites. Many disturbed areas would remain permanently barren. Wildlife populations would be low.

There would be no impacts to cultural resources. Access would remain limited.

Visual resource quality would remain poor.

Socioeconomic conditions would remain as they are.

Green Book Proposal

No specifications to mitigate the effects of blasting are proposed. Possible damage to the homes in Paguate Village could occur.

All mine entries would be sealed and their resources would become inaccessible. All protore would be placed in the open pits and would not be lost to erosion. Gavilan Mesa would eventually collapse and bury the protore buttress at its base.

All highwalls would be scaled to reduce rockfall hazards. The North and South Paguate pit highwalls would be stable. Modifications to Gavilan Mesa would make it only slightly more stable than under the No Action Alternative and it would fail.

Thirteen waste dumps would fail and 12 could fail. Environmental consequences would be the same as the No Action Alternative.

All underground openings would be sealed thus eliminating the subsidence and radiological hazards.

After reclamation, lung cancer deaths would be 10 percent of the No Action Alternative. All other cancer deaths would be reduced to less than 0.1 percent of the No Action Alternative.

There would be a one-time loss of 3,000 to 4,000 acre-feet of water which would percolate into the pit backfill. Evapotranspiration from the pit bottoms would remove about 200 acre-feet per year. Waste dump reclamation would reduce erosion which, in turn, would decrease TDS and heavy metal concentrations in the rivers. Up to 200 acres of intermittent ponds in the pit bottoms would be saline and unproductive for livestock use. Ground water would show a temporary increase in TDS and heavy metals. As the ground water reverts to a reducing state this leaching effect would decrease. Pit bottoms would retain a lens of shallow salt water.

FD-2, I and Y2 dumps would probably be stable. All other dumps would be stable.

All underground openings, including the P-10 decline, would be treated the same as the Green Book Proposal and would result in the same impacts.

Radiological health impacts would be the same as the Green Book Proposal.

There would be a one-time loss of 3,000 to 4,000 acre-feet of water which would percolate into the pit backfill. Gentler waste dump slopes would reduce erosion 50 percent compared to the Green Book Proposal resulting in a corresponding decrease in TDS and heavy metal concentrations in the rivers. For the Monitor Option, any ponded water in the pit bottoms would be eliminated by remedial action; ponds would not exist under the Drainage Option. For the Monitor Option, ground water quality would be better than under the Green Book Proposal due to reduced evapotranspiration from the pit bottoms. The Drainage Option would further reduce the likelihood of evapotranspiration from waterlogged soils.

An improved, no-maintenance armoring system would be used to stabilize all headcuts.

Sedimentation of Paguate Reservoir would be reduced by reclamation.

The removal of waste dumps 200' back from the centerline of the Rios Paguate and Moquino would result in the same impacts as described under the Green Book Proposal.

For both options, mean total waste dump erosion would be 13 tons per acre per year (an 82 percent reduction from the No Action Alternative and a 50 percent reduction from the Green Book Proposal). For the Drainage Option, sediment would be generated from approximately two square miles of externally draining pits.

TSP levels would be in the same range as for the Green Book Proposal.

Vegetative cover would be at least 90 percent of that on surrounding natural land. Reclaimed plant communities would therefore be more comparable with natural communities in terms of vegetative diversity and production, soil retention and carrying capacity for native and domestic herbivores.

Impacts to cultural resources would be the same as the Green Book Proposal.

Visual resource quality would be enhanced over the Green Book Proposal.

Impacts on employment and income would be the same as the Green Book Proposal.

Energy usage would be 290,000 kilowatt hours and 5.3 to 5.5 million gallons of fuel. Reclamation would require 198 (Monitor Option) and 203 (Drainage Option) man-years of labor. Equipment use accidents are estimated to be 29.8 for the Monitor Option and 30.5 for the Drainage Option.

Laguna Proposal

Most impacts would be the same as DOI's Proposal. The primary differences are noted below.

Limited blasting proposed. Specifications for limiting ground movement only. Air blast effects could result in broken windows and other minor damage.

Recovery of buried protore would be enhanced because the protore would be segregated by grade and the location plotted on maps for future reference.

Gavilan Mesa could eventually fail.

Waste dump FD-2 would be probably stable. All other waste dumps would be stable.

The arroyo west of waste dump FD-3 would be relocated and not need stabilization.

Waste dumps along the Rio Moquino would be pulled back 50' and the dump toes armored with riprap. This design would have surface water quality impacts similar to the Green Book Proposal but would be more maintenance dependent. Waste dumps along the Rio Paguate would be moved back 100' from the centerline of the river. This centerline distance would not provide the same degree of protection against lateral movement and erosion as provided for under the Green Book Proposal.

Since the top layer of backfill would be Mancos Shale, there is a possibility of temporary saturation of the topsoil/shale interface resulting in upward migration of salts which could inhibit plant growth.

Energy usage would be 292,000 kilowatt hours and 3.7 million gallons of fuel. Reclamation would require 137 man-years of labor. There could be 20.6 equipment use accidents.

Anaconda Proposal

No blasting would be proposed.

Preferred Alternative

Specifications are proposed to control ground vibration and air blast effects. No blast related damage expected.

Underground resources would be inaccessible. All protore would be buried in the open pits and not lost to erosion.

Rockfall hazards would be reduced by scaling the highwalls. North and South pit highwalls would be stable. Gavilan Mesa could eventually fail. North and South Paguate pit highwalls would be fenced to limit access to the crests.

FD-2 dump would be probably stable. All other waste dumps would be stable.

P-10 decline would be backfilled and sealed to eliminate any subsidence hazard. All underground openings would be sealed and all associated hazards eliminated.

Post-reclamation radiological impacts would be less than 0.1 percent of the No Action Alternative except for lung cancer deaths which would be reduced to 10 percent of the No Action Alternative.

There would be a one-time loss of 3,000 to 4,000 acre-feet of water which would percolate into the pit backfill. Water quality in the Rio Paguate would improve over time. Backfill would be added to the pit bottoms as necessary to control ponded water and saline soil. Ground water quality would improve due to evapotranspiration from the pit bottoms.

An improved, no maintenance armoring system would be used to stabilize all headcuts.

Sedimentation of Paguate Reservoir would be reduced by reclamation.

Two options are presented for stream stabilization: Option A - would remove all waste material 200' from the Rios Paguate and Moquino providing a buffer against lateral migration, bank caving and thus reducing water quality impacts described under the No Action Alternative, and Option B - would remove all waste material 50' from the Rio Moquino and use riprap for protection against erosion and flood events. Along the Rio Paguate, all contaminated material would be moved back 100 feet from the river. Option B is more mainteance dependent than Option A.

Mean total waste dump erosion would be 13 tons per acre per year (an 82 percent reduction from existing conditions). TSP levels are expected within Federal and State standards.

Vegetation cover would be at least 90 percent of that on surrounding natural communities in terms of vegetative diversity and production, soil retention and carrying capacity for native and domestic herbivores.

For the short-term, recovery of protore would be enhanced. Over the long-term, protore would be lost to erosion. For underground deposits and mine entries, the impacts would be the same as the Green Book Proposal.

The North and South Paguate pit highwalls would be stable; Gavilan Mesa could eventually fail. Lack of fencing and scaling could be hazardous.

Thirteen waste dumps would fail resulting in the impacts described under the No Action Alternative.

The minimal topsoil cover on the protore piles and a 70 percent revegetative success criteria would not ensure a stable plant community over the long-term. Failure to provide for a stable plant community would result in increased erosion rates and subsequent release of radiological materials into the air and water. Mitigation of these impacts would require extensive maintenance and rehabitation.

The total evaporative losses from the reclaimed pit bottoms and the North Paguate water storage reservoir would be greater than the perpetual 200 acre-feet per year of the No Action Alternative.

The impacts of arroyo headcutting would be the same as the Green Book Proposal.

Sedimentation of Paguate Reservoir would be reduced by reclamation.

Since waste dumps would only be moved back 50' from the centerlines of the Rios Paguate and Moquino, lateral migration of the rivers could lead to increased TDS, heavy metal, and possibly radionuclide concentrations.

Mean total waste dump erosion would be 21 tons per acre per year (a 73 percent reduction from the No Action Alternative).

TSP levels would be within Federal and State standards. Over the long-term, soil cover on protore piles would erode exposing radiological materials to the air.

For areas outside the pits, impacts would be the same as the Green Book Proposal. Phreatophytes may not survive over the long-term due to surface salt build-up.

Impacts to cultural and visual resources would be the same as the Green Book Proposal.

Impacts on employment and income would be the same as the Green Book Proposal.

Energy usage would be 292,000 kilowatt hours and 2.1 million gallons of fuel. Reclamation would require 7 man-years of labor. There could be 11.6 equipment use accidents.

Improved access to cultural sites could lead to increased vandalism as well as providing easier access for religious purposes.

Visual resource quality would be enhanced compared to other reclamation proposals.

Reclamation would temporarily increase employment and income.

Energy usage would be 290,000 to 292,000 kilowatt hours and from 3.7 to 5.3 million gallons of fuel. Reclamation would require 137 to 198 man-years of labor. There could be 20.6 to 29.8 equipment use accidents.